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Section 4. Whistlers and Related Phenomena

The routine observations of whistlers have been continued by means of magnetic tape recording in two minutes every hour at Moshiri(L=1.6), Sakushima(L=1.3) and Kagoshima(L=1.2). To reduce a great deal of analyzing time by means of aural counting and sonograph, the real-time whistler analyzers are equipped in parallel with the usual MT recording at the three stations.

The ducted propagation of the daytime whistlers at low and medium latitudes has been evidenced by the direction findings('DFs') with the field-analysis method at Moshiri and by the goniometry DFs at multiple stations. The computations of ray paths in a duct superimposed on the equatorial anomaly also confirm the ducted propagation of daytime whistlers, and consequently elucidate the close relation of daytime whistlers with the equatorial anomaly.

T.Okada stayed at L.P.H.A. of Poitiers University France, in order to study the propagation mechanism of medium-latitude whistlers by comparing the ground-based whistler data obtained in our VLF campaign of 1976-1979 in Europe with the in-situ data on the satellites ISIS-1, 2. Prof.Y.Corcuff and Dr.M.Tixier of LPHA and he have established a preceding partially ducted whistler and its 'doublet' component on the in-situ data, due to the reflection of the preceding signals incident on a lower ionospheric level.

A riometer system using corner reflector antennas was installed at Moshiri, in order to measure cosmic noise absorption(CNA) at 30 and 60 MHz. A pair of the corner reflector antennas at 30 and 60 MHz are directed toward the Pole Star to reduce the sidereal variation of CNA, and the other toward the Earth's magnetic field line intersecting Moshiri, in order to detect the enhanced ionization caused by energetic electrons and protons precipitating through the loss cone along the field line due to wave-particle and wave-wave interactions while executing the planning active experiments by LF waves transmitted toward the field line.

To prepare the active experiments for wave-particle and wave-wave

interaction studies in the magnetosphere, a LF (~ 100 kHz) transmitter using power MOS transistors is also being developed, and a field test to measure the radiation efficiency of a LF transmitting antenna (Decca) was done for reference to search an optimum LF transmitting antenna for our future active experiments.

PLHR which seems to be of natural origin is, from time to time, found in the whistler data. We are planning to examine the PLHR by detailed measurements in frequency and power spectra and the coincidence of the occurrence in spaced points.

A new VHF (74 MHz) DF system using Rocke-type Adcock antenna has been developed to locate nearby lightnings with bearing errors less than 1° . It is found from the DF results that the locations of lightnings are distributed within the region of a causative thundercloud at ranges less than 120 km. Our newly developed DF system will be able to satisfy the social demand to protect ultra high voltage electric power transmission systems from lightning-caused interruptions.

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